AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) An apparatus for wet processing the device side of individual wafers, comprising:

an acoustic energy generator;

a wafer bracket for positioning a wafer having a device side and a non-device side over the acoustic generator, wherein the device side of the wafer is distal to the acoustic generator and the non-device side of the wafer is proximate to the acoustic generator;

a first liquid dispenser for flowing a first liquid between said acoustic energy generator and said wafer;

wherein the first liquid is in extensive contact with both the acoustic generator and the wafer, providing the predominant means of transferring acoustic energy from the acoustic generator to the non-device side of the wafer;

a second liquid dispenser for flowing a processing liquid onto said device side of the wafer; and

wherein the acoustic energy irradiating the non-device side of the wafer is transferred to the device side of the wafer having a frequency and intensity at the device side of the wafer to provide a substantive improvement in the cleaning performance of the processing liquid on the device side of the wafer, while also minimizing the associated risk of damage to the devices on the wafer due to the sonic energy acting on the device side of the wafer.

2. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy strikes the wafer non-device side perpendicular.

3. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy generator further comprises:

one or more acoustic wave transducers mounted on the acoustic generator and positioned to be parallel to and facing the non-device side of the wafer.

4. (Canceled)

5. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy generator comprises a platter having a frontside and a backside; wherein the one or more acoustic wave transducers are mounted on the platter backside.

6. (Original) The apparatus for wet processing individual wafers of claim 1, further comprising:

a device for rotating the wafer.

7. (Original) The apparatus for wet processing individual wafers of claim 1, further comprising:

a device for linearly transporting the wafer.

8. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the second liquid dispenser is a nozzle positioned to direct a liquid flow onto the device side of the wafer.

9. (Previously Presented) The apparatus for wet processing individual wafers of claim 3, wherein the one or more acoustic wave transducers comprise a piezoelectric material.

10. (Original) The apparatus for wet processing individual wafers of claim 5, wherein the platter is positioned parallel to the wafer surface, with the platter front side facing the wafer non-device side.

11. (Original) The apparatus for wet processing individual wafers of claim 10, wherein the platter diameter is at least 95% the diameter of the wafer.

12. (Original) The apparatus for wet processing individual wafers of claim 11, wherein the one or more acoustic wave transducers are mounted on the platter backside to cover 50-100% of the platter backside area.

13. (Original) The apparatus for wet processing individual wafers of claim 3, wherein the one or more acoustic wave transducers cover the radius of a wafer.

14. (Original) The apparatus for wet processing individual wafers of claim 3, wherein the one or more acoustic wave transducers cover the diameter of a wafer.

15. (Original) The apparatus for wet processing individual wafers of claim 3, wherein the one or more acoustic wave transducers provide acoustic energy to cover 50-100% of the non-device side of the wafer.

16. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy generator comprises one or more acoustic wave transducers having a resonance frequency of 5.4 MHz ± 30% for 300 mm wafers.

17. (Canceled)

18. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy generator comprises one or more acoustic wave transducers having a resonance frequency less than 1.5 MHz.

19. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the generated acoustic energy is pulsed.

20-21. (Canceled)

22. (Original) The apparatus for wet processing individual wafers of claim 5, further comprising a through hole in the platter for flowing a liquid.

23. (Original) The apparatus for wet processing individual wafers of claim 22, further comprising a fluid feed tube attached to the through hole at the platter backside.

24. (Original) The apparatus for wet processing individual wafers of claim 5, wherein a coating is applied to the platter frontside.

25. (Original) The apparatus for wet processing individual wafers of claim 24, wherein the coating is a fluoropolymer.

26-44. (Canceled)

45. (Currently Amended) The ~~An~~ apparatus of claim 1, wherein the acoustic energy generator further comprises ~~for wet processing a device side of individual wafers, comprising~~:

a platter having a frontside and a backside, comprising:

a plurality of megasonic piezoelectric transducers attached to the backside of the platter; and wherein

the a wafer bracket to position a wafer having a device side and a non-device side over said acoustic energy generator, further positions the wafer over said platter such that said non-device side of the wafer is positioned substantially parallel to and over the platter front side so that a gap is formed between said wafer non-device side and said platter frontside; and wherein said first liquid dispenser comprises:

a liquid feed port for flowing a liquid in said gap between said wafer non-device side and said platter frontside;

wherein said liquid fills said gap extensively contacting both the frontside of the platter and the non-device side of the wafer; and wherein the second liquid dispenser comprises:

a nozzle for directing a processing liquid flow onto said device side of the wafer to be processed, and

wherein said transducers apply megasonic energy to said platter, which transfers the megasonic energy to said liquid in said gap, which transfers to said non-device side of the wafer, which transfers to the device side of the wafer, and then, transfers the megasonic energy to the processing fluid on the device side of the wafer.

46. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the plurality of transducer areas provide between 90-100% coverage of the wafer non-device side.

47-51. (Canceled)

52. (Previously Presented) The apparatus of claim 45 wherein said wafer bracket is capable of rotation up to 6000 rpm.

53-220. (Canceled)

221. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy generator comprises a plurality of acoustic wave transducers having different resonance frequencies.

222. (Previously Presented) The apparatus for wet processing individual wafers of claim 221, wherein the plurality of acoustic wave transducers having different resonance frequencies are selected to effectively remove different sized particles from the device side of the wafer.

223. (Previously Presented) The apparatus for wet processing individual wafers of claim 221, wherein the different resonance frequencies comprise about 900 KHz and about 1.8 MHz.

224. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy generator comprises an acoustic wave transducer having a resonance frequency, which minimizes sonic wave reflections in the wafer.

225. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the first liquid and the process liquid are different liquids while they are in contact with the non-device side and device side of the wafer, respectively.

226. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the process liquid is limited to a relatively thin layer of process liquid on the device side of the wafer, so as to concentrate the sonic energy within the thin liquid layer to facilitate

the removal of particles without substantially increasing the risk of damage to the devices on the wafer.

227. (Previously Presented) The apparatus for wet processing individual wafers of claim 1, wherein the acoustic energy generator comprises a plurality of acoustic wave transducers having different resonance frequencies, in which their intensities are separately controllable.

228. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the plurality of transducer cover greater than 80% of the platter backside area.

229. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the platter further comprises a coating on the platter frontside.

230. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the platter has a diameter greater than the wafer to be processed.

231. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the wafer bracket positions the wafer substantially centered over the platter.

232. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the plurality of megasonic transducers comprise a plurality of piezoelectric transducers having different resonance frequencies.

233. (Previously Presented) The apparatus for wet processing individual wafers of claim 232, wherein the plurality of piezoelectric transducers having different resonance frequencies are selected to effectively remove different sized particles from the device side of the wafer.

234. (Previously Presented) The apparatus for wet processing individual wafers of claim 233, wherein the different resonance frequencies comprise about 900 KHz and about 1.8 MHz.

235. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the plurality of megasonic transducers comprises a piezoelectric transducer having a resonance frequency, which minimizes megasonic reflections in the wafer.

236. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the said liquid and the said process liquid are different fluids, which are maintained separate from each other before and while in contact with the non-device side and device side of the wafer, respectively.

237. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the process liquid is limited to a relatively thin layer of process liquid on the device side of the wafer, so as to concentrate the sonic energy within the thin liquid layer to facilitate the removal of particles without substantially increasing the risk of damage to the devices on the wafer.

238. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the plurality of megasonic transducers comprise a plurality of piezoelectric transducers having different resonance frequencies, in which their intensities are separately controllable.

239. (Previously Presented) The apparatus for wet processing individual wafers of claim 45, wherein the platter further comprises an opening in said platter to flow a fluid in said gap between said wafer backside and said platter frontside.

240. (Previously Presented) The apparatus of claim 239 wherein said hole is positioned substantially in the center of said platter.

241. (Previously Presented) The apparatus of claim 239 wherein said hole is slightly offset from the center of said platter.